

Number Sense for ALL Learners!

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Presentation Overview

- Overview of math challenges
- Technology for math education
- Brief overview of Stages
- “Stages Math: Number Sense”

Math Challenges

- Learning challenges in mathematics are complex.
- There is no single mathematics challenge.

Math Challenges

- Students may be strong in some areas of math and weak in others.
- From 6–7% of all students exhibit challenges in one or more areas of math.

Math Challenges

- Some mathematics challenges are independent of reading disability and some are not.
- Research about math challenges has progressed more slowly than research about reading challenges.

Signs of a Math Challenge

- Has difficulty keeping track of numerical information while counting.
- Forgets arithmetic facts or doesn't remember as many.
- May use immature problem solving procedures.

Signs of a Math Challenge

- Has difficulty with the abstract concepts of time and direction.
- When writing, reading and recalling numbers: adds, substitutes, transposes, omits, and reverses numbers.
- Demonstrates poor mental math ability.

Signs of a Math Challenge

- Has difficulty keeping score during games; loses track of whose turn it is.
- Unable to grasp and remember math concepts, rules, formulas, sequence (order of operations), and basic math facts.
- Gets lost or disoriented easily; may have a poor sense of direction.

Signs of a Math Challenge

- Children with a math challenge can have one or both of two memory problems:
 1. Getting basic facts into long term memory and accessing memorized facts.
 2. Sifting through all the recalled memorized facts for the relevant information; e.g., $2 + 3$ might evoke answers of 4, 5, or 6

Despite the signs of a math challenge, a learner may:

- Show normal or accelerated language acquisition: verbal, reading, writing.
- Have good visual memory for the printed word.
- Excel in other areas.
- Catch up; it may be a developmental delay and not a more fundamental deficit.

Assessing Math Abilities

1. Conduct a one-to-one mathematics interview.
2. Note how the child does mathematics.
3. Search for strategies that work or don't work, strengths and weaknesses.

Assessing Math Abilities

4. Assess the full range of areas: computation, pattern prediction, sorting, measuring, organizing space with flexibility.
5. Observe and note any verbalization, drawings, asking for repeat of directions/question.
6. Ask child to estimate answer before computing.

How to help students with math challenges:

1. Work to define the student's strengths.
2. Encourage students to estimate their answers before they begin to work out the problem.
3. Have students work together in small groups to solve problems.
4. Allow the use of calculators.

Use of calculators

Research has shown that using calculators does not:

- promote laziness
- impede development of basic math skills
- create a dependency on technology

Instead it does:

- promote achievement
- improve problem solving skills
- increase understanding of mathematical ideas

Students retain more information and gain a better attitude toward math.

To be successful...

Students should work toward:

- number sense mastery
- good problem solving strategies
- automaticity (recall of facts)

this allows more brainpower to go toward problem solving (not spent on computing)

Students with number sense can:

1. Count rationally past 100.
2. Understand that the sequence of counting doesn't change.
3. Count objects in any order.
4. Know that last number named is total number.
5. Count past difficult numbers (19, 29, 100).
6. Count backwards, starting with any number.
7. Skip count by 2s, 5s, and 10s.
8. Relate basic addition and subtraction facts.
9. Explain operation of multiplication.
10. Explain place values through the hundreds.

A Letter to My Math Teacher:

- ❖ "I need instant answers and a chance to do the problem over once if I get it wrong the first time."
- ❖ "Problems written too closely together on the page cause me mental confusion and distress."
- ❖ "Please allow me more than the standard time to complete problems and please check to see that I am free of panic (tears in my eyes, mind frozen)."
- ❖ "If possible, please allow me to take the exam on a one-to-one basis in your presence."
- ❖ "I am not lazy, and I feel really smart in everything but math. That is what frustrates me the most! Everything is easy for me to learn, but Math makes me feel stupid! Please, do be patient with me, and please do not give up on me!"

(source at end)

10 Tips for Software Selection for Math Instruction

by Beatrice C. Babbitt

1. The **less clutter** on the screen, the better.
2. Procedures should **match** those being taught in school.
3. Choose **modifiable** software. Software should allow for customized speed, number of problems and instructional levels.
4. Choose software with **small increments** between levels.

10 Tips for Software Selection for Math Instruction

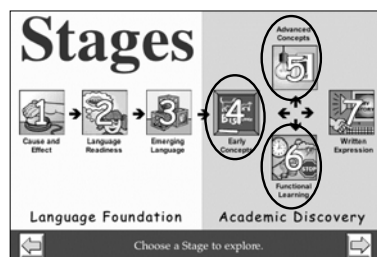
5. Choose software with **helpful feedback**. Provide clues to the correct answer.
6. Choose software that **limits** the number of wrong answers for a single problem. Limit the number of attempts, give clues to the correct answer, reintroduce that same item at a later time.
7. Choose software with good **record keeping** capabilities.

10 Tips for Software Selection for Math Instruction

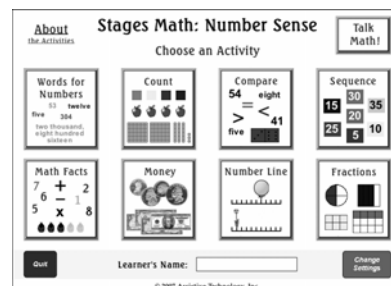
8. Choose software with built in **instructional aids**; e.g., counters, number lines, base ten blocks, hundreds charts, or fraction strips.
9. Select software that simulates **real-life solutions**; e.g., multiple roads to a problem solution.
10. Remember that software is a **learning tool** – not the total solution!

Stages Solutions for Special Needs

Stages is a framework for identifying the cognitive and language skills of learners with special needs. Stages assessment software shows a learner's abilities.

**Highlights of Stages Math: Number Sense**

- 20 main activities within 8 key content areas of number sense

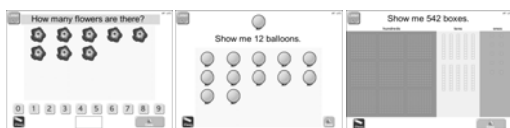
**Highlights of Stages Math: Number Sense**

- **Universal design**
mouse, keyboard, switch, alternative pointer, touch screen;
auditory scanning, text-to-speech
- **Feedback for incorrect answers that builds learner understanding**
- **Scaffolding to support learner success**
turn on or off prompting, graphical support, help buttons, etc.;
talk boards for classroom inclusion
- **Adjustable settings you can save for each learner**

Words for Numbers

- Recognize that numbers have numerical and text representations.
- Associate verbal names, written word names, and standard numerals with whole numbers within a given range.
- Read and write numerals to 100 or more.
- Match a number to its written name.
- Write a number when given its written name.
- Understand the meaning and position of a comma used in large numbers.
- Explore and use place value.

Count



- Count objects using one-to-one correspondence.
- Use numbers and pictures to describe how many objects are in a set (up to 100).
- Count objects by ones and tens.
- Explore and use place value.
- Use place value representations to count up to 999 objects.

Compare



- Know the relationships between larger and smaller numbers.
- Estimate and verify by counting sets that have more, fewer, or the same number of objects.
- Compare whole numbers using terms and symbols, e.g. less than, equal to, greater than (<, =, >).
- Determine which symbol (<, =, >) is appropriate for a given number sentence, e.g., $7 + 8$? $4 + 6$.
- Compare numbers represented in different ways: numerals, words, number sentences, coin values, sets of objects, dominoes, and fractions.

Sequence



- Show an understanding of the relative size of numbers.
- Identify one more than, one less than, 10 more than, and 10 less than a given number.
- Continue or complete a number pattern.
- Count forward and backward.
- Count by intervals such as 2s, 5s, 10s, 20s, 50s (skip count).
- Use ordinal numbers to identify positions of objects in sequences.
- Order numbers up to 999.

Math Facts



- Show the effect of putting together and taking apart sets of objects.
- Use concrete objects to solve number problems with one operation.
- Understand the meaning of the symbols +, -, x, =.
- Use concrete and pictorial models to recall and apply basic addition and subtraction facts and use them to solve problems.
- Select addition or subtraction and use the operation to solve problems involving whole numbers through 999.
- Use repeated addition, arrays, and counting by multiples to do multiplication.
- Solve simple multiplication problems.
- Memorize multiplication table for numbers between 1 and 10.

Money



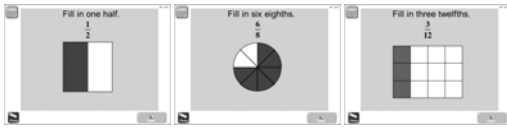
- Identify and know the value of coins and show different combinations of coins that equal the same value.
- Count coins using "mixed" counting (using coin values of 25, 10, 5, and 1 cents).
- Find the value of a collection of coins and dollar bills and different ways to represent an amount of money.
- Use appropriate notation, e.g., 69¢, \$1.35.
- Solve problems using combinations of coins and bills.

Number Line



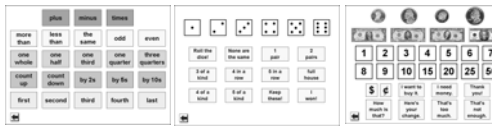
- Use language to describe relative position of whole numbers on a number line up to 10 or more (for example, 4 is before 5, 5 is after 4; 5 is 3 more than 2; 6 is 2 less than 8).
- Estimate the relative size of numbers on a number line.
- Count forward and backward from a known starting point.
- Locate numbers on a number line from 0 to 10 or more.
- Locate on a number line and compare fractions (between 0 and 1 with denominators 2, 3, or 4, e.g., $2/3$).
- Identify fraction and decimal equivalents.

Fractions



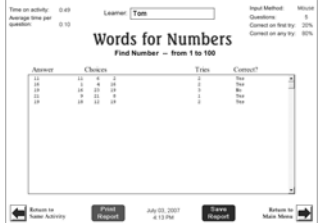
- Recognize that there are quantities less than a whole.
- Understand that the total of equivalent fractional parts makes a whole (for example, two halves equal one whole).
- Represent and compare halves, thirds, quarters, and eighths as part of a whole, using concrete materials and drawings.
- Recognize, name, and compare unit fractions from $1/12$ to $1/2$.
- Understand that different parts can be added to get the same whole.
- Use concrete models to represent and name fractional parts of a whole object (with denominators of 12 or less)

Talk Math!




Stages Math: Number Sense includes *Talk Math!*, a set of nine communication boards with over 200 words and phrases that speak. Learners can access them to engage in math class discussions and participate with their classmates in off-computer activities and games that use math manipulatives.

Stages Math Report



A *Stages Math: Number Sense* report contains the learner's responses, number of tries, time on the activity, average time per question, accuracy, activity settings, and session date and time.

Stages Math Settings



Settings include number of questions, number of tries, custom feedback, choice of reward, access and highlight settings, level of help, voices, etc. Settings can be saved for individual learners.

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**Thank you for
attending**

***Number Sense
for ALL Learners!***

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